

L6 Assessment 3 2024-25

1.

Find the gradient of the line with equation $2x + 5y = 7$

Circle your answer.

[1 mark]

$\frac{2}{5}$

$\frac{5}{2}$

$-\frac{2}{5}$

$-\frac{5}{2}$

2.

At a point P on a curve, the gradient of the tangent to the curve is 10

State the gradient of the normal to the curve at P

Circle your answer.

[1 mark]

-10

-0.1

0.1

10

3.

The circle with equation $(x - 7)^2 + (y + 2)^2 = 5$ has centre C .

(a) (i) Write down the radius of the circle.

[1 mark]

(a) (ii) Write down the coordinates of C .

[1 mark]

(b) Hence, find the equation of the tangent to the circle at the point $(1, 10)$, giving your answer in the form $ax + by + c = 0$ where a , b and c are integers.

[4 marks]

(c) The point $Q(3, 3)$ lies outside the circle and the point T lies on the circle such that QT is a tangent to the circle. Find the length of QT .

[4 marks]

4.

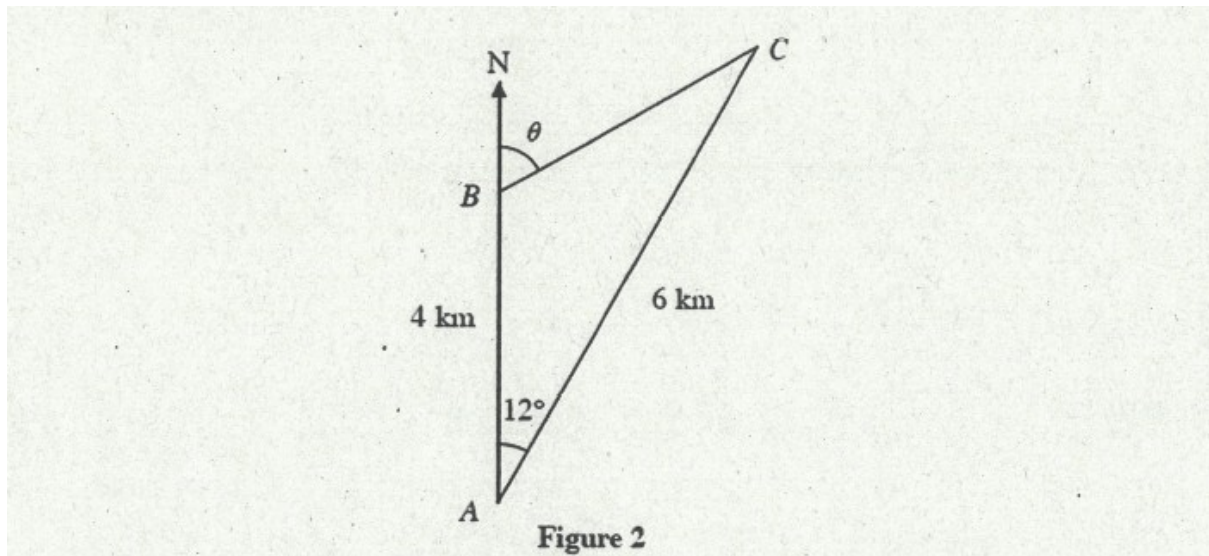


Figure 2 shows the positions of planes A , B and C at a particular instant in time, which are assumed to be in the same horizontal plane. Plane B is 4 km due north of plane A and plane C is 6 km from plane A .

- (a) Calculate the distance between plane B and plane C .
Give your answer to the nearest 0.5 km.

(2)

The bearing of plane C from plane B is θ° , as shown in Figure 2.

- (b) Find the value of θ to the nearest degree.

(3)

5.

A curve has equation $y = 6x\sqrt{x} + \frac{32}{x}$ for $x > 0$

- (a) Find $\frac{dy}{dx}$

[4 marks]

- (b) The point A lies on the curve and has x -coordinate 4

Find the coordinates of the point where the tangent to the curve at A crosses the x -axis.

[5 marks]

6.

A curve has equation

$$y = x^3 - 6x + \frac{9}{x}$$

- (a) Show that the x coordinates of the stationary points of the curve satisfy the equation

$$x^4 - 2x^2 - 3 = 0$$

[3 marks]

- (b) Deduce that the curve has exactly two stationary points.

[3 marks]

- (c) Find the coordinates and nature of the two stationary points.

Fully justify your answer.

[4 marks]

- (d) Write down the equation of a line which is a tangent to the curve in two places.

[1 mark]

7.

The point A has coordinates $(-1, a)$ and the point B has coordinates $(3, b)$

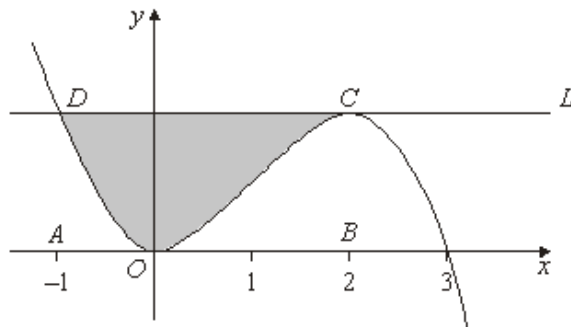
The line AB has equation $5x + 4y = 17$

Find the equation of the perpendicular bisector of the points A and B .

[4 marks]

8.

The diagram shows the curve with equation $y = 3x^2 - x^3$ and the line L .



The points A and B have coordinates $(-1, 0)$ and $(2, 0)$ respectively. The curve touches the x -axis at the origin O and crosses the x -axis at the point $(3, 0)$. The line L cuts the curve at the point D where $x = -1$ and touches the curve at C where $x = 2$.

(a) Find the area of the rectangle $ABCD$.

[2 marks]

(b) (i) Find $\int (3x^2 - x^3) dx$.

[3 marks]

Show all working for this question:

(ii) Hence find the area of the shaded region bounded by the curve and the line L .

[4 marks]